

Application No.: 10/620,865

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Docket No.: 245402006600

Client Reference No.: 903127-01(TaM/kh)

REMARKS

Claims 11-14, 16 and 17 are pending in the present application. By virtue of this response, claim 11 has been amended, and new claim 18 has been added. Accordingly, claims 11-14, 16 and 17-18 are currently under consideration. Amendment and cancellation of certain claims is not to be construed as a dedication to the public of any of the subject matter of the claims as previously presented.

The support for the amended claim 11 is at least found on page 9 at line 27 and Figure 3. The support for the new claim 18 is at least found on page 8 at line 32 to page 9 at line 2. No new matter has been added.

Rejections under 35 USC § 103

Claims 11-14 and 16-17 are rejected under 35 USC § 103(a) as allegedly being unpatentable over Reid (US 2003/0210720) in view of Onomura et al. (US 2002/0039374) and further in view of Gen-ei et al. (US 2002/0105981). Applicants respectfully traverse these rejections.

As amended, Claim 11 includes the limitations of a nitride semiconductor stacked-layered structure of a hexagonal crystal system and a length L1 of more than 500 μm in a longitudinal direction of said stripe structure and a length L2 of more than 200 μm and less than 300 μm in a width direction of said stripe structure, and L1/L2 is more than 2.5; and a total thickness of said nitride semiconductor substrate and said nitride semiconductor stacked-layered structure is more than 50 μm and less than 200 μm . Neither Reid, Onomura, Gen-ei, or the combination of the three has disclosed, taught, or suggested the motivation to combine their respective invention to form these claim limitations. These requirements are used for applying stress from the outside to the laser chip so as to elongate the lifetime of the laser device.

One of the motivations of the present invention is to solve the problem of reliability of conventional nitride semiconductor laser device chip because no attention has been paid to the

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shape and dimensions of the conventional chip to elongate the lifetime of the laser device (see, e.g. Background of the pending application at pages 1-2). The combination of the three references has not disclosed, taught, or suggested the motivation to combine their respective invention to control the chip dimensions in order to manage the anisotropic stress generated in the chip. For example, Reid teaches nothing regarding stress caused in and applied to the laser device chip. Onomura discloses a semiconductor multilayer structure with which internal stress can be reduced in a laser device chip and thus teaches away from the present invention in which the anisotropic stress is applied to the laser chip. Gen-ei discloses a sub-mount of AlN, SiC, Si, or the like, a solder, and a multi-metal-layer for reducing thermal stress caused between a support base and a laser device chip (see page 3, paragraph [0036]), and thus Gen-ei also teaches away from the present invention in which stress is applied to the laser chip.

On the other hand, the laser device of the present invention is fabricated by using nitride semiconductor materials having the anisotropic hexagonal crystal system (different from the isotropic zinc blend crystal structure, e.g., GaAs). The laser device chip is cut from a wafer to have a relatively large value of L1/L2 to cause a proper anisotropic stress in the chip (see, e.g. specification at page 8, lines 2-8). The chip has a multi-metal-layer including the outermost Au layer and is tightly bonded to a support base by using the specific desirable solder. The chip can be provided with additional stress caused when it is bonded to the support base, thereby being further improved in the laser device properties (see, e.g. specification, page 10, lines 7-12). The improving effect can be enhanced by using the support base of a material having a thermal coefficient larger than that of the nitride semiconductor substrate, because the chip can be provided with thermal stress caused when it is bonded to the support base by heating to melt the solder.

Furthermore, in the anisotropic hexagonal crystal system of the present invention, when the pair of the side surfaces perpendicular to the longitudinal direction of said stripe structure are selected to be parallel to a cleavable crystallographic plane, then the other pair of the side surfaces parallel to the longitudinal direction of said stripe structure cannot be selected to be parallel to a cleavable crystallographic plane, which is distinguished from the isotropic cubic crystal system (see, e.g. specification, page 8 at line 32 to page 9 at line 2).

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For at least the reasons presented above, Claim 11 and its dependent claims 12-14 and 16-18 should not be found obvious over Reid in view of Onomura and further in view of Gen-ei.

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CONCLUSION


In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of the claims and to pass this application to issue. If it is determined that a telephone conference would expedite the prosecution of this application, the Examiner is invited to telephone the undersigned at the number given below.

In the event the U.S. Patent and Trademark office determines that an extension and/or other relief is required, applicant petitions for any required relief including extensions of time and authorizes the Commissioner to charge the cost of such petitions and/or other fees due in connection with the filing of this document to Deposit Account No. 03-1952 referencing docket no.

245402006600. However, the Commissioner is not authorized to charge the cost of the issue fee to the Deposit Account.

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Respectfully submitted,


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